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摘要: 以2个杂交大豆品种(杂交豆1号和杂交豆2号)以及同熟期组的2个常规品种(吉育72和吉林30)为试材,于2010~2011年通过盆栽和大田试验,分析不同时期品种根系发育形态、活力以及产量的差异。结果表明:杂交大豆比常规品种2年平均增产15.3%,分枝粒重显著增加;杂交大豆R2~R7期根系干重和体积显著增加,二者均在R5期有最大增幅;R2、R5和R7期杂交大豆平均主根长、一级侧根数和一级侧根总长较常规大豆增幅均达13%以上,并在R2期增幅最大;R2~R4期根瘤干重、根冠比及R2~R5期杂交大豆根系活力均显著增加;大田条件下,30~75 cm土层杂交大豆根系干重显著增加。生殖生长期杂交大豆根系主根长、一级侧根数、一级侧根总长、根瘤干重、根系活力及深层次根系重量的强优势,保障强大的根系生物积累,为杂交大豆高产奠定了基础。

Abstract: Two soybean hybrids (HybSoy-1 and HybSoy-2), and two conventional cultivars (CV) with the same maturity (Jiyu 72 and Jilin 30) were planted in pot and field experiments during 2010-2011, the differences in root morphological development and root activity at various growth stages were analyzed. Compared with CV, the average yield of soybean hybrids in two years enhanced by 15.3% due to the significant increment of seed weight on the branches. Root dry weight and root volume of soybean hybrids increased significantly at R2-R7 and maximized at R5. At R2, R5 and R7 stage, the increment of average taproot length, primary lateral root number and its overall length of soybean hybrids were all higher than 13%, and maximized at R5. Nodule dry weight and root to shoot ratio from R2 to R4, as well as root activity from R2 to R5 of soybean hybrids were all significantly increased. In field trials, root dry weight in 30-75 cm soil layer of soybean hybrids increased significantly. Therefore, these significant advantages of soybean hybrids at reproductive growth stage, such as taproot length, number of primary lateral roots, overall length of primary roots, dry weight of root nodule, root activity and root weight in deep soil layer, guaranteed the powerful biological accumulation of root, and laid the base for high yield of soybean hybrids.

参考文献/References:

- [1] 赵全志, 乔江方, 刘辉, 等. 水稻根系与叶片光合特性的关系[J]. 中国农业科学, 2007, 40(5): 1064-1068. (Zhao Q Z, Qiao J F, Liu H, et al. Relationship between root and leaf photosynthetic characteristic in rice[J]. Scientia Agricultura Sinica, 2007, 40(5): 1064-1068.)
- [2] Kan S Y, Morita S, Yamazaki K. Root growth and distribution in some Japonica indica hybrid and Japonica type rice (Oryza sativa) cultivars under field conditions[J]. Japanese Journal of Crop Science, 1994, 63(1): 118-124.
- [3] 凌启鸿, 陆卫平, 蔡建中, 等. 水稻根系分布与叶角关系的研究初报[J]. 作物学报, 1989, 15(2): 123-131. (Ling Q H, Lu W P, Cai J Z, et al. The relationship between root distribution and leaf angle in rice plant[J]. Acta Agronomica Sinica, 1989, 15(2): 123-131.)
- [4] 王彦荣, 华泽田, 陈温福, 等. 粳稻根系与叶片衰老的关系及其对籽粒灌浆结实的影响[J]. 作物学报, 2003, 29(6): 892-898.

- (Wang Y R, Hua Z T, Chen W F, et al. Relation between root and leaf senescence and their effects on grain filling in Japonica rice[J]. Acta Agronomica Sinica, 2003, 29(6): 892-898.)
- [5] 刘桃菊, 戚昌翰, 唐建军. 水稻根系建成与产量及其构成关系的研究[J]. 中国农业科学, 2002, 35(11): 1416-1419. (Liu T J, Qi C H, Tang J J. Studies on relationship between the character parameters of root and yield formation in rice [J]. Scientia Agricultura Sinica, 2002, 35(11): 1416-1419.)
- [6] 唐文帮, 邓化冰, 肖应辉, 等. 两系杂交水稻C 两优系列组合的高产根系特征[J]. 中国农业科学, 2010, 43(14): 2859-2868. (Tang W B, Deng H B, Xiao Y H, et al. Root characteristics of high yield C Liangyou rice combinations of two line hybrid rice[J]. Scientia Agricultura Sinica, 2010, 43(14): 2859-2868.)
- [7] 杨秀红, 吴宗璞, 张国栋. 大豆品种根系性状与地上部性状的相关性研究[J]. 作物学报, 2002, 28(1): 72-75. (Yang X H, Wu Z P, Zhang G D. Correlations between characteristics of roots and those of aerial parts of soybean varieties[J]. Acta Agronomica Sinica, 2002, 28(1): 72-75.)
- [8] 姚琳, 徐克章, 张治安, 等. 吉林省不同年代育成大豆品种根瘤数量鲜重和体积的变化[J]. 中国油料作物学报, 2009, 31(2): 196-201. (Yao L, Xu K Z, Zhang Z A, et al. Nodule number fresh weight and volume of soybean cultivars over the years in Jilin province[J]. Chinese Journal of Oil Crop Sciences, 2009, 31(2): 196-201.)
- [9] 孙苗苗, 邓宏中, 徐克章, 等. 不同年代大豆品种根系伤流液重量变化及其与叶片光合的关系[J]. 大豆科学, 2011, 30(5): 796-799. (Sun M M, Deng H Z, Xu K Z, et al. Nodule number fresh weight and volume of soybean cultivars over the years in Jilin province[J]. Soybean Science, 2011, 30(5): 796-799.)
- [10] 金剑, 王光华, 刘晓冰, 等. 东北黑土区高产大豆R5 期根系分布特征[J]. 中国油料作物学报, 2007, 29(3): 266-271. (Jin J, Wang G H, Liu X B, et al. Characteristics of root distribution at R5 stage in high yielding soybean in black soil [J]. Chinese Journal of Oil Crop Sciences, 2007, 29(3): 266-271.)
- [11] 盖钧镒, 胡蕴珠, 马育华. 中美大豆品种间F1 和F3 杂种优势与配合方分析[J]. 大豆科学, 1984, 3(3): 183-191. (Gai J Y, Hu Y Z, Ma Y H. Heterosis and combining ability performed in F1 and F3 hybrids between soybean cultivars from the PRC and US[J]. Soybean Science, 1984, 3(3): 183-191.)
- [12] 王志新, 郭泰, 齐宁, 等. 大豆杂种优势高优势组合筛选及稳定性分析[J]. 中国农学通报, 2001, 17(2): 27-29. (Wang Z X, Guo T, Qi N, et al. Selection of high superiority cross combination for soybean heterosis and its stability analysis[J]. Chinese Agricultural Science Bulletin, 2001, 17(2): 27-29.)
- [13] 彭宝, 赵丽梅, 王曙明, 等. 高产杂交大豆新品种杂交2 号制种技术[J]. 大豆科技, 2008(4): 46-47. (Peng B, Zhao L M, Wang S M, et al. High production hybrid soybean new variety HybSoy 2 and hybrid seed production technology [J]. Soybean Science & Technology, 2008(4): 46-47.)
- [14] 赵丽梅, 孙震, 王曙明, 等. 大豆杂交种杂交1 号选育报告[J]. 中国油料作物学报, 2004, 26(3): 15-17. (Zhao L M, Sun H, Wang S M, et al. Breeding of hybrid soybean HybSoy 1[J]. Chinese Journal of Oil Crop Sciences, 2004, 26(3): 15-17.)
- [15] 任冬莲, 陆贵利, 刘学义. 大豆成苗期抗旱性与根系生长关系研究[J]. 中国油料, 1993(1): 37-39. (Ren D L, Lu G H, Liu X Y. Study on the relationship between tolerance to drought and growth of roots of soybean in seedling stage [J]. Chinese Journal of Oil Crop Sciences, 1993(1): 37-39.)
- [16] 董钻. 盆栽条件下大豆冠根比研究初报[J]. 吉林农业科学, 1982(4): 22-26. (Dong Z. Study on root/shoot ratio during pot experiment[J]. Jilin Agricultural Science, 1982(4): 22-26.)
- [17] Koutroubas S D, Papakosta D K, Gagianas A A. The importance of early dry matter and nitrogen accumulation in soybean yield[J]. European Journal of Agronomy, 1998, 9: 1-10.
- [18] Specht J E, Hume D J, Kumudini S V. Soybean yield potential a genetic and physiological perspective[J]. Crop Science, 1999, 39: 1560-1570.
- [19] Liu X B, Jin J, Herbert S J, et al. Yield components, dry matter, LAI and LAD of soybeans in northeast China [J]. Field Crop Research, 2005, 93: 85-93.
- [20] 王庆仁, 李继云, 李振声. 高效利用土壤磷素的植物营养学研究[J]. 生态学报, 1999, 19(3): 417-421. (Wang Q R, Li J Y, Li Z S. Studies on plant nutrition of efficient utility for soil phosphorus[J]. Acta Ecologica Sinica, 1999, 19(3): 417-421.)
- [21] Lynch J. Root architecture and plant productivity[J]. Plant Physiology, 1995, 109: 7-13.
- [22] Gahoonia T S, Nielsen N E. Barley genotypes with long root hairs sustain high grain yields in low P field [J]. Plant and Soil, 2004, 262: 55-62.
- [23] Costa C, Dwyer L M, Hamilton R I, et al. A sampling method for measurement of large root systems with scanner based image analysis[J]. Agronomy Journal, 2000, 92: 621-627.
- [24] Graham R D. Breeding for nutritional characteristics in cereals[J]. Advances in Plant Nutrition, 1984(1): 57-102.
- [25] 张玉芹, 杨恒山, 高聚林, 等. 超高产春玉米的根系特征[J]. 作物学报, 2011, 37(4): 735-743. (Zhang Y Q, Yang H S, Gao J L, et al. Root characteristics of super high yield spring maize[J]. Acta Agronomica Sinica, 2011, 37(4): 735-743.)
- [26] Monita S, Suga T, Yamazaki K. The relationship between root length density and yield in rice plants[J]. Japanese Journal of Crop Science, 1988, 57: 438-443.
- [27] Bergersen F J, Turner G L, Gault R R, et al. The natural abundance of ^{15}N in an irrigated soybean crop and its use for calculation of nitrogen fixation[J]. Australian Journal of Agricultural Research, 1985, 36: 411-423.
- [28] Unkovich M J, Pate J S. An appraisal of recent field measurements of symbiotic N_2 fixation by annual legume [J]. Field Crops Research, 2000, 65: 211-228.
- [29] 龚振平, 金喜军, 马春梅, 等. 春大豆对不同来源氮素吸收利用的研究[J]. 土壤通报, 2010, 41(5): 1138-1141. (Gong Z P, Jin X J, Ma C M, et al. Study on the absorption and utilization of various source nitrogen by spring soybean [J]. Chinese Journal of Soil Science, 2010, 41(5): 1138-1141.)
- [30] 宋海星, 申斯乐, 马淑英, 等. 硝态氮和氨态氮对大豆根瘤固氮的影响[J]. 大豆科学, 1997, 16(4): 283-287. (Song H X, Shen S L, Ma S Y, et al. Effect of NO_3N and NH_4N on the nitrogen fixation of soybean nodules[J]. Soybean Science, 1997, 16(4): 283-287.)
- [31] Breias N, Planchon C. Increasing soybean productivity through selection for nitrogen fixation[J]. Agronomy Journal, 1990, 82: 1031-1034.
- [32] 王空军, 董树亭, 胡昌浩, 等. 我国玉米品种更替过程中根系生理特性的演进 I 根系活性与ATPase 活性的变化[J]. 作物学报, 2002, 28(2): 285-289. (Wang K J, Dong S T, Hu C H, et al. The evolution of physiological characteristics of maize root during varieties replacing in China, 1950s to 1990s: I. Changes of root vigor & ATPase activity[J]. Acta Agronomica Sinica, 2002, 28(2): 285-289.)

相似文献/References:

- [1] 张伟龙, 张伟, 张井勇, 等. 父母本行比、行距配置对海南地区杂交大豆制种产量的影响[J]. (darticle.aspx?type=view&id=201302009) 大豆科学, 2013, 32(02): 182. [doi:10.3969/j.issn.1000-9841.2013.02.009]
- [2] 边秀芝, 郭金瑞, 阎孝贵, 等. 吉林中部大豆高产氮磷钾肥适宜用量研究[J]. (darticle.aspx?type=view&id=200906039) 大豆科学, 2009, 28(06): 1123. [doi:10.11861/j.issn.1000-9841.2009.06.1123]
- BIAN Xiu-zhi, GUO Jin-rui, YAN Xiao-gong, et al. Optimum Rate of NPK Fertilizer Application for Soybean at Central Area of [J]. Soybean Science, 2009, 28(03): 1123. [doi:10.11861/j.issn.1000-9841.2009.06.1123]
- [3] 王岚, 王连铮, 赵荣娟, 等. 高产高油早熟广适应性大豆新品种中黄35的选育[J]. (darticle.aspx?type=view&id=200902042) 大豆科学, 2009, 28(02): 360. [doi:10.11861/j.issn.1000-9841.2009.02.0360]
- WANG Lan, WANG Lian-zheng, ZHAO Rong-juan, et al. Development of New Soybean Cultivar Zhonghuang 35 with High Yielding, High Oil, Early Maturity and Broad Adaptability[J]. Soybean Science, 2009, 28(03): 360. [doi:10.11861/j.issn.1000-9841.2009.02.0360]
- [4] 陈喜凤, 孙宁, 谷岩, 等. 杂交大豆与普通大豆关键生理特性的比较研究[J]. (darticle.aspx?type=view&id=201406011) 大豆科学, 2014, 33(06): 853. [doi:10.11861/j.issn.1000-9841.2014.06.0853]

- CHEN Xi-feng, SUN Ning, GU Yan, et al. Comparative Research on the Characteristics of Photosynthetic Physiology between Hybrid and Common Soybean[J]. Soybean Science, 2014, 33(03):853. [doi:10.11861/j.issn.1000-9841.2014.06.0853]
- [5] 赵青松, 闫龙, 刘兵强, 等. 高产广适优质大豆品种冀豆17[J]. (article.aspx?type=view&id=201504035) 大豆科学, 2015, 34(04):736. [doi:10.11861/j.issn.1000-9841.2015.04.0736]
- ZHAO Qing-song, YAN Long, LIU Bing-qiang, et al. Breeding of High-yield Widespread and High-quality Soybean Cultivar Jidou 17[J]. Soybean Science, 2015, 34(03):736. [doi:10.11861/j.issn.1000-9841.2015.04.0736]
- [6] 戴旼和, 张磊, 黄志平, 张丽亚, 胡晨. M型杂交大豆新组合HS9816高产原因及栽培技术研究[J]. (article.aspx?type=view&id=200303005) 大豆科学, 2003, 22(03):181. [doi:10.11861/j.issn.1000-9841.2003.03.0181]
- Dai Ouhe, Zhang Lei, Huang Zhiping, Zhang Liya, Hu Chen. STUDY ON THE REASONS AND CULTIVATION TECHNOLOGY FOR HIGH YIELD OF M HYBRID SOYBEAN HS9816[J]. Soybean Science, 2003, 22(03):181. [doi:10.11861/j.issn.1000-9841.2003.03.0181]
- [7] 胡立成, 林蔚刚, 董丽华, 等. 重茬条件下黑农37大豆高产综合技术数学模型研究[J]. (article.aspx?type=view&id=199602011) 大豆科学, 1996, 15(02):130. [doi:10.11861/j.issn.1000-9841.1996.02.0130]
- [7] 胡立成, 林蔚刚, 董丽华, 等. 重茬条件下黑农37大豆高产综合技术数学模型研究[J]. (article.aspx?type=view&id=199602011) 大豆科学, 1996, 15(02):130. [doi:10.11861/j.issn.1000-9841.1996.02.0130]
- [8] 刘雪骄, 王明玖, 索荣臻. 利用SRAP分子标记鉴定内蒙古栽培大豆与野生大豆杂交后代真实性[J]. (article.aspx?type=view&id=201702005) 大豆科学, 2017, 36(02):193. [doi:10.11861/j.issn.1000-9841.2017.02.0193]
- LIU Xuejiao, WANG Mingjiu, SUO Rongzhen. The Authentic Evaluation on Hybrids of Wild Soybean and Cultivated Soybean Based on SRAP Marker in Inner Mongolia[J]. Soybean Science, 2017, 36(03):193. [doi:10.11861/j.issn.1000-9841.2017.02.0193]
- [9] 张艳伟, 薛丽华, 章建新, 等. 新疆高产春大豆鼓粒的粒位差异研究[J]. (article.aspx?type=view&id=201705008) 大豆科学, 2017, 36(05):710. [doi:10.11861/j.issn.1000-9841.2017.05.0710]
- ZHANG Yan-wei, XUE Li-hua, ZHANG Jian-xin, et al. Study on Seed-bulging of High-yield Spring Soybean in Xinjiang[J]. Soybean Science, 2017, 36(03):710. [doi:10.11861/j.issn.1000-9841.2017.05.0710]
- [10] 张伟梅. 优质高产秋大豆品种丽秋6号的选育[J]. (article.aspx?type=view&id=201804025) 大豆科学, 2018, 37(04):655. [doi:10.11861/j.issn.1000-9841.2018.04.0655]
- ZHANG Wei-mei. Breeding of New Autumn Soybean Liqiu 6 with High Quality and Yield[J]. Soybean Science, 2018, 37(03):655. [doi:10.11861/j.issn.1000-9841.2018.04.0655]

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